## -REMARKS/ARGUMENTS-

Claims 1 to 3, 5 to 8, and 10 to 18 are now in the application.

**Comments on Response to Arguments Section of the Office Action**

In response to the "Response to Arguments Section" of the Office Action, the Examiner cites Lowrie (US 4,122,672) to show that it is well known to make a multi-piece engine case into an integral assembly.

The Examiner seems to equate "fan case" to "turbofan case". The fan case is only a portion of the turbofan case. Each portion of the turbofan case performs a different function and is exposed to different operating conditions. For instance, the fan case must be able to contain blade-off events, whereas the gas generator casing portion must be able to withstand very high temperatures. Lowrie clearly does not teach or suggest integrating such different turbofan casing portions.

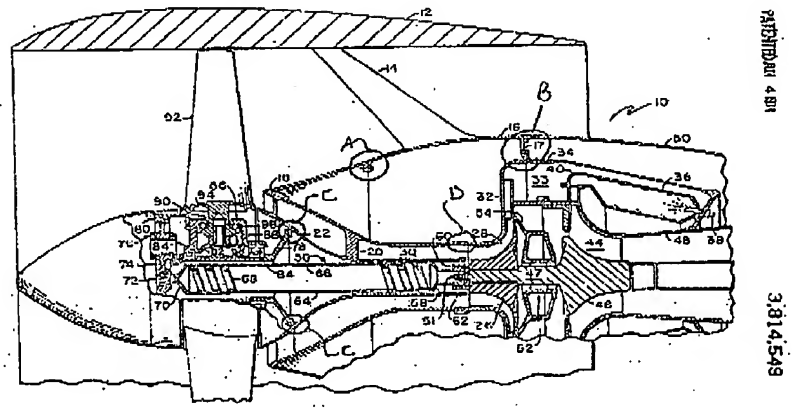
Lowrie discusses fan case but not intermediate case or gas generator case. Lowrie states that fan case components can be welded together, but does not describe how the connection to the intermediate case is made. As shown in Lowrie's Fig. 2, the intermediate case begins in the vicinity of the unnumbered strut/vane, downstream of fan case annulus 24. So, while Lowrie does state that the fan case annuli 18, 20 and 24 can be welded together, no discussion of the intermediate case is made. The intermediate case is a term of art for the case portion between the fan case and the gas generator case. Fan case performs one function, and is typically made from a single material and, as such, welding is quite feasible. However, the intermediate case of an engine, particularly an engine of the size of Lowrie, is made of a dissimilar material and, as such, is not inherently weldable to the fan case. Therefore, the passage at column 2, lines 49 to 60, as referred to by the Examiner to assist the new 102 rejections that will be discussed hereinafter, do not disclose to the skilled reader how dissimilar materials of the fan case, intermediate case and gas generator case (presumed by the skilled reader since this is conventional, and Lowrie does not teach the same material) would be welded together and, therefore, the skilled reader would not interpret the passage at column 2, lines 49 to 60 as applying beyond the fan case.

**Claim Rejections Under 35 U.S.C. 102**

Claims 1, and 3 to 15 stand rejected under 35 U.S.C. 102(b) as being anticipated by Cronstedt (US 3,814,549).

Reconsideration is expected on the following grounds.

Cronstedt is directed to damping arrangements for shafts. Cronstedt is not even remotely concerned with turbofan casing designs. Cronstedt omits so many essential features of good case design, such as blade containment, noise reduction, assembly of internal parts, temperatures to be sustained, weight, stacking tolerances, etc. that it is impossible for one skilled in the art to reach any meaningful conclusion as to Cronstedt's turbofan casing design. Cronstedt simply does not teach anything as far as engine casing design is concerned. Cronstedt's unique figure has been prepared to illustrate the details of the shaft damping arrangements. All the other environmental features, including the casing, are so structurally simplified and, as such, they could not reasonably suggest anything to one having ordinary skill in the art. The representation of the fan shroud 12 is clearly schematic and not realistic, as evidenced by the fan shroud wall thickness. It is also respectfully submitted that the text of Cronstedt is silent as to how the various engine casing portions are connected. However, from Cronstedt's figure, reproduced hereinbelow, it can be appreciated that Cronstedt's engine casing assembly comprises at least three bolted flange connections A, B and C and at least one sliding joint D.




The flange connection B between 17, 32 and 34 is clearly a bolted flange connection. The connection 16, 17, 32 and 34 cannot possibly be welded since there would be no access for assembling the compressor rotor and casing components inside the outer engine housing 16.

It is also respectfully submitted that the outer engine housing 16 is not a gas generator case. Cronstedt's outer engine housing does not house the combustor 36. The combustor 36 is rather surrounded by housing 34, which can only be bolted to the outer housing 16 at connection B to permit the assembly of the internal parts of the engine.

Also, it is respectfully submitted that the outer engine housing 16 is not a compressor shroud, as suggested by the Examiner. The compressor shroud rather corresponds to item 32, which is portion of the nose section 18, which is, in turn, bolted to outer engine 16 at connection A (see the above Cronstedt annotated figure).

The Examiner is referring to Cronstedt's fan shroud as both corresponding to Applicant's claimed fan case and intermediate case portion. Applicant fails to understand how Cronstedt's fan shroud 12 can be viewed as in intermediate case portion. The rear portion of Cronstedt's fan shroud 12 surrounds Cronstedt's outer engine housing 16, which the Examiner construed as corresponding to Applicant's claimed gas generator portion. Furthermore, how can the Examiner state that the Cronstedt outer engine housing 16 corresponds to Applicant's

claimed gas generator case and, at the same time, sustain that Cronstedt's outer engine housing 16 also corresponds to Applicant's claimed integral compressor shroud, which is claimed as a part of the intermediate case portion, not as part of the gas generator case portion?

The Examiner is also of the opinion that Cronstedt teaches an integral bearing seat 84. Applicant respectfully disagrees. As shown in the above annotated figure, connection C represents a bolted flange connection. The bearing seat 84 is bolted to the inner housing 22, which is, in turn, bolted to outer housing 16 at flange connection A.

The Examiner has also of the opinion that Cronstedt teaches a fan case portion, an intermediate case portion and a gas generator case portion joined together by flangeless connections. As explained hereinabove, Cronstedt's fan case 12 cannot be viewed as corresponding to both a fan case and an intermediate case and Cronstedt's outer housing16 is not a gas generator case.

The connections between Cronstedt's fan case 12, compressor shroud 32 and gas generator case 34 comprise several flange connections (see A, B and C in the above-annotated figure). Also, it is respectfully submitted that connection D between compressor shroud 32 and nose section 18 is a sliding joint. Connection D must be a sliding joint, i.e. not a weld or other fixed connection, to permit assembly of Cronstedt's internal engine parts.

Dependent claim 5 has been amended to recite a first weld between the fan case portion and the intermediate case portion and a second weld between the intermediate case portion and the gas generator case portion. The casing recited in claim 5 is thus now defined by its structure. Cronstedt clearly fails to teach the first and second welds.

The Examiner is relying on Lowrie and Chaplin et al. (US 4,722,184) to support his argument that integral case constructions are known and that, as such, an illustration of what appears to correspond to an integral assembly should be taken at face value as integral.

Notwithstanding the fact that Cronstedt shows a multi-piece casing assembly, it is respectfully submitted that both Lowrie and Chaplin et al. fail to teach the integration of

different case parts performing different functions and, thus, requiring different properties into a one-piece integrated casing.

As discussed above, Lowrie only teaches integrating portions of the fan case, the fan case being only one part of the overall turbofan engine casing.

Chaplin et al. shows, at Fig. 2, that the struts 52 are integral with the outer annulus 28 of the stator assembly. The stator assembly is shown, in Fig. 2, to be bolted on an upstream side to the fan exit case 46 and the fan case 44 (flanges and bolts are depicted in Fig. 2). Column 4, lines 5 to 9 say that the strut is integral with the "fan exist case 46" and the "engine casing 54". These three items together provide the intermediate case. In fact, this is quite conventional, as the intermediate case of turbofan engines are usually cast, and so the fact that 46, 52 and 44 are integrally joined would not be surprising for the skilled reader, as this is conventional. Fan case 44 is bolted upstream of this intermediate case. There is no mention of how the intermediate case portion attaches to the gas generator case. Fig. 1 seems to show a single piece or integrated case between engine casing 54 and the gas generator casing (unnumbered), but the figure is obviously schematic because (a) the engine would be unassemblable if provided in one piece (the combustion case 20, for example, would not physically be able to be inserted inside the gas generator case, and (b) key casing characteristics are missing, such as fan blade containment, etc., which indicate that the construction of the turbofan case, as depicted in Fig. 1, is schematic only and is not intended to say anything about engine case design to the skilled reader.

In summary, Cronstedt only shows a multi-piece engine case assembly comprising several bolted flange connections A, B, C and a sliding joint D to permit assembly of the internal rotor parts of the engine. Lowrie and Chaplin also fail to teach integrating engine casing portions performing different functions.

In view of the foregoing, withdrawal of the above 103 rejection is respectfully requested.

Claims1, 2, 12, 13 and 15 stand rejected under 35 U.S.C. 102 as being anticipated by Springer (US 6,532,731).

Reconsideration is expected on the following grounds.

Springer would not have reasonably suggested to one ordinarily skilled in the art to integrally join the fan case, the intermediate case and the gas generator case. Springer's patent describes a broad concept, and is not intended to explain to the skilled reader how the casing is made. For example, Fig. 3 appears to show a single-piece-multi-stage stator vane set 42 interlaced with a single-piece-multi-stage axial flow compressor 46. However, the skilled reader will understand that this is physically not assemblable, i.e. the engine shown is imaginary and the stator and compressor stages necessarily contain connections which are not depicted. Similarly, Figs. 2 and 4 lack stator vanes altogether. A multi-stage compressor would require vanes to function. Likewise, the engine case lacks basic design details, such as provisions for blade containment, sound attenuation, thermal mismatch, which indicate to the skilled reader that Springer is not concerned with disclosing a real engine case design. Springer's engine is not assemblable and, therefore, does not teach the skilled person how to make a functioning engine case.

The Examiner is again relying on Lowrie to provide evidence that it is known to join fan case sections and that, as such, schematic illustrations of integral fan cases should be taken at face value as integral.

As mentioned hereinbefore, Lowrie only teaches integrating the fan case portions. The fan case is only a portion of the claimed turbofan case, which also includes other casing portions containing the compressor and gas generator sections of the engine. Lowrie's fan case is only one of the claimed elements and, as such, Lowrie cannot be used to show that it is known to integrate different case portions having drastically different functions.

In view of the foregoing, withdrawal of this 102 rejection is respectfully requested.

Claims 1, 5, 7, 8, 11 to 13, and 15 also stand rejected under 35 U.S.C. 102(b), as being anticipated by Stuart (US 4,790,133).

Reconsideration is expected on the following grounds.

Stuart would not have reasonably suggested to one skilled in the art how a turbofan engine is made, since too many basic design details are omitted. How could Stuart teach anything about casing designs and not address the role, functions, and key features of the various

portions of the design? Stuart's figures are so simplified that they do not teach anything as to the construction and assembly of the various engine parts. For example, Fig. 2 appears to show a single-piece rotor 72 having blades 74 interlaced with the blade 70 of another one-piece rotor 68. However, one skilled in the art would understand that this is physically not assemblable. Therefore, the engine shown in Stuart's Fig. 1 is only conceptual and the rotor parts and surrounding casing necessarily contains connections, which are not depicted. One skilled in the art would readily understand that the engine shown in Stuart's Fig. 1 is conceptual and that no construction details can be derived therefrom.

Withdrawal of Stuart's 102 rejection is thus anticipated.

**Claims Rejection Under 35 U.S.C. 103**

Claims 1 to 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Cronstedt in view of Lowrie and optionally Chaplin.

Reconsideration is expected on the following grounds.

As set forth hereinbefore, Cronstedt discloses a multi-piece case. Lowrie only provides for a welded fan case (the fan case being only one portion of the turbofan case). Chaplin provides for an integral intermediate case and a bolted fan case. Combination of the three cited references would result in a welded fan case bolted to an integral intermediate case, bolted to a compressor shroud. This clearly does not provide the claimed invention.

Accordingly, withdrawal of the above 103 rejection is respectfully requested.

Claims 1 to 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Romani (US 6,145,300) in view of Lowrie and optionally Chaplin.

Reconsideration is expected on the following grounds.

Romani does not depict or discuss the construction of the gas generator case. The "cast" outer ring 20 describes a cast intermediate case, which, although it is called a "fan case 1" in the description, still clearly has a "fan case extension" bolted to a leading edge of the fan/intermediate case (see connection A in Romani's Fig. 1 reproduced hereinbelow). The bolts are not shown, but the bolt holes and flange are clearly shown. Accordingly, Romani

does not cure the deficiencies of the secondary references and, as such, the combination of Romani, Lowrie and Chaplin does not provide the claimed invention. Withdrawal of this 103 rejection is thus also anticipated.

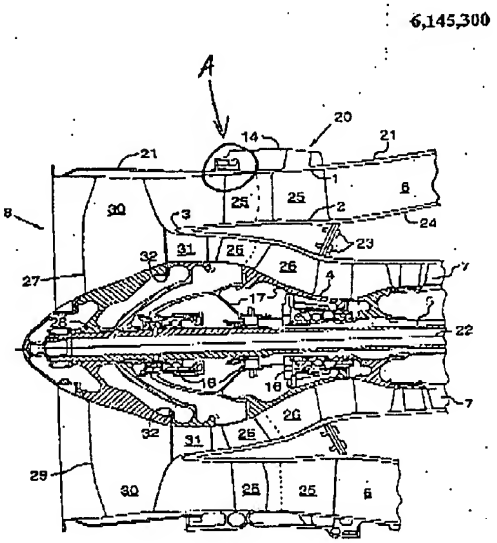



FIG.1

Claims 1, 2, 5, 7, 8, 11, 12, 13 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Stuart in view of Lowrie and optionally Chaplin et al.

As discussed hereinbefore in the 102 rejection section of the present remarks, none of the above cited references teaches integrating different engine casing portions requiring different properties. As such, withdrawal of this 103 rejection is also anticipated.

Claims 1, 2, 5 to 7, 11 to 13, and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Udall et al. (US 5,409,184) in view of Lowrie.

As mentioned above, Lowrie discusses fan case only. Lowrie does not teach how to connect the fan case to the intermediate case and the gas generator case of a turbofan case.

With regard to Udall et al., the core case is not fully depicted, nor is the core casing or fan casing discussed. There is no support for the allegation that the core casing or fan casing are themselves integral or one-piece structures, regardless of any integral connection to the frame. Furthermore, although the members 36 and 37 are "integrally formed with or secured to", the respective casings, a few lines earlier the spokes 34 are taught as being only "secured at their radially inner ends" to member 36 and "connected at their radially outer ends" to member 37 (column 3, lines 47 to 53) clearly omitting integration as an option in both cases. Thus, by comparison, Udall teaches that spokes 34 cannot be integrated provided with members 36 and 37 and thus cannot teach an integrally joined fan and core casings, as alleged.

Therefore, the alleged combination does not teach the invention and the rejection is therefore improper and should be withdrawn.

Claims 3, 4, 9, 10 and 14 were also rejected under 35 U.S.C. 103(a) as being unpatentable over either the Udall et al. combination or the Stuart combination, as applied above, and further in view of Allen et al. (US 6,109,022).

The Allen et al. reference does not cure the deficiencies of the primary references and, as such, claims 3, 4, 9, 10 and 14 are patentable for at least the reasons set forth above with respect to independent claims 1, 7 and 12.

Attached is an Affidavit of one of the co-inventors, Mr. Andreas Elfetheriou, which is herein submitted for the Examiner's consideration. Mr. Eleftheriou's Affidavit is submitted to show that the cited references would not reasonably suggest integrating a fan case, an intermediate case and a gas generator case in the context of a turbofan engine. The cited references do not answer any of the role, function or key features to be considered in the design of a turbofan case and, as such, do not provide any teaching.

In view of the foregoing, the application is believed to be in condition for allowance, and an early action to this effect would be much appreciated.

Respectfully submitted,

Andreas ELEFTHERIOU et al.

By: _____

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Date

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Enclosure - Appendix - Affidavit of Andreas Eleftheriou

**APPENDIX**